

EXHIBIT D
TO REQUEST FOR RECONSIDERATION OF HOLDING OF
ABANDONMENT PURSUANT TO 37 C.F.R. § 1.112 AND
MPEP 711.03
SERIAL NO. 10/074,604

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Patent
Attorney Docket: 157835-0008

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In re the Application of:

Lawrence R. FINCHAM

Serial No.: 10/074,604

Filed: February 11, 2002

For: **SOUND SYSTEM AND
METHOD OF SOUND
REPRODUCTION**) **Group Art Unit: 4826**) **Examiner: Michalski, Justin I.**) **Office Action mailed:**) **November 25, 2003****DEC 20 2004****CORRECTED¹ AMENDMENT AND RESPONSE TO OFFICE ACTION**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This paper is responsive to the Office Action dated November 25, 2003. Claims 1-58 are pending in the instant application. Initially Applicant gratefully acknowledges the indication of allowability of claims 8-10, 18, 19, 30, 42, 54, and 55 (subject to being rewritten in independent form). Claims 1-7, 11-17, 20-29, 31-41, 43-53, and 56-58, however, presently stand rejected under 35 U.S.C. § 102(b) and 103(a) as allegedly unpatentable over various cited items. Without acquiescence in the grounds of the rejection, Applicant herein has amended independent claims 1, 13, 24, 35, and 46 to incorporate the limitations of certain allowed dependent claims and the intervening dependent claims (specifically, claims 8, 17, 18, 29, 30, 36, 40, 42, 54), and have

¹ This paper makes minor corrections to the status identifiers in the Amendment and Response filed on February 25, 2004. Specifically, the identifier "Amended" has been corrected to read "Currently Amended" in the listing of claims.

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consequently canceled those same dependent claims. It is therefore believed that all of the currently pending claims are in condition for final allowance.

Accordingly, please amend this application as shown herein. In view of the amendments herein, final allowance of the application is respectfully requested.

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this paper.

Remarks begin on page 18 of this paper.

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AMENDMENTS TO THE CLAIMS

Please cancel claims 8, 17, 18, 29, 30, 36, 40, 42, 54 and 58 without acquiescence in the grounds of rejection, and without prejudice to pursue at a later time by continuation application or otherwise.

Please amend claims 1, 9, 10, 13, 19, 20, 24, 31, 35, 37, 41, 43, 44, 46 and 55 with the following amended version thereof.

This listing of claims will replace all prior versions, and listings, of claims in the application.

LISTING OF CLAIMS

1. (Currently Amended) A sound system, comprising:
a left speaker and a right speaker located in close proximity;
a left channel audio signal;
a right channel audio signal; and

a sound processor receiving as inputs said left channel audio signal and said right channel audio signal, said sound processor configured to cross-cancel a spectrally weighted stereo difference signal with said left channel audio signal and said right channel audio signal prior to applying said left channel audio signal and said right channel audio signal to said left speaker and said right speaker, respectively[.];

wherein said sound processor further comprises a phase equalizer for equalizing the phase of said spectrally weighted stereo difference signal prior to cross-cancellation.

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and a plurality of phase compensators, having a phase characteristic complementary to said phase equalizer and said spectral weighting filter over a frequency band of desired cross-cancellation, placed in series along each of said left channel audio signal and right channel audio signal, respectively, prior to cross-cancellation.

2. (Original) The sound system of claim 1, wherein said sound processor is configured to generate a difference signal representing a difference between said left channel audio signal and said right channel audio signal, and to apply a spectral weighting to said difference signal thereby generating said spectrally weighted signal.

3. (Original) The sound system of claim 2, wherein said sound processor comprises a subtractor for generating said difference signal.

4. (Original) The sound system of claim 2, wherein said sound processor comprises a spectral weighting filter for applying said spectral weighting to said difference signal, said spectral weighting filter being characterized by a first filter region of relatively level gain, a second filter region having a generally decreasing gain with increasing frequency, and a third filter region of relatively level gain.

5. (Original) The sound system of claim 4, wherein said spectral weighting filter is further characterized by a roll-off from said first filter region to said second filter region at approximately 200 Hertz.

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6. (Original) The sound system of claim 5, wherein said spectral weighting filter is further characterized by a boundary between said second filter region and said third filter region at approximately 2 KHz.

7. (Original) The sound system of claim 2, wherein said sound processor comprises a linear filter for applying the spectral weighting to said difference signal.

8. (Canceled)

9. (Currently Amended) The sound system of claim ~~[[8]]~~ 1, wherein said phase equalizer comprises a plurality of all pass filters collectively having a first phase transfer function, and wherein each of said phase compensators comprises a plurality of all pass filters collectively having a second phase transfer function complementary to a combined phase characteristic of said phase equalizer and said spectral weighting filter over a frequency band of desired cross-cancellation.

10. (Currently Amended) The sound system of claim ~~[[8]]~~ 1, wherein said phase equalizer comprises a second order filter.

11. (Original) The sound system of claim 1, wherein said left channel audio signal comprises a surround left channel audio signal coupled to a surround left speaker, wherein said right channel audio signal comprises a surround right channel audio signal which is coupled to a surround right speaker, and wherein said left speaker

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and said right speaker comprise a surround back left speaker and a surround back right speaker, respectively, for utilization in a surround sound stereo system.

12. (Original) The sound system of claim 1, wherein said sound processor is implemented in whole or in part in the digital domain.

13. (Currently Amended) A system for adaptive sound reproduction in a manner so as to enlarge the perceived area and stability of a stereo sound image, comprising:

a left speaker and a right speaker located in close proximity;

a left channel audio signal;

a right channel audio signal;

a subtractor receiving as inputs said left channel audio signal and right channel audio signal, and outputting a difference signal representing a difference between said left channel audio signal and said right channel audio signal;

a spectral weighting filter receiving said difference signal as an input and outputting a spectrally weighted signal; [and]

a cross-cancellation circuit for mixing said spectrally weighted signal with said left channel audio signal and said right channel audio signal, thereby generating a first speaker signal for said left speaker and a second speaker signal for said right speaker[.];

a phase equalizer interposed between said spectral weighting filter and said cross-cancellation circuit;

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a first phase compensator interposed between said left channel audio signal and said cross-cancellation circuit, said first phase compensator having a phase characteristic complementary to a combined phase characteristic of said phase equalizer and said spectral weighting filter; and

a second phase compensator interposed between said right channel audio signal and said cross-cancellation circuit, said second phase compensator having a phase characteristic complementary to said combined phase characteristic.

14. (Original) The system of claim 13, wherein said spectral weighting filter is characterized by a first filter region of relatively level gain, a second filter region having a generally decreasing gain with increasing frequency, and a third filter region of relatively level gain.

15. (Original) The system of claim 14, wherein said spectral weighting filter is further characterized by a roll-off from said first filter region to said second filter region at approximately 200 Hertz.

16. (Original) The system of claim 15, wherein said spectral weighting filter is further characterized by a boundary between said second filter region and said third filter region at approximately 2 KHz.

17. (Canceled)

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18. (Canceled)

19. (Currently Amended) The system of claim ~~[[18]]~~ 13, wherein said phase equalizer comprises a plurality of all pass filters, and wherein said first phase compensator and said second phase compensator each comprises a plurality of all pass filters having a substantially identical phase transfer function.

20. (Currently Amended) The system of claim ~~[[17]]~~ 13, wherein said phase equalizer comprises a second order filter.

21. (Original) The system of claim 13, wherein said spectral weighting filter comprises a linear filter.

22. (Original) The system of claim 13, wherein said left channel audio signal comprises a surround left channel audio signal which is electrically connected to a surround left speaker, wherein said right channel audio signal comprises a surround right channel audio signal which is electrically connected to a surround right speaker, and wherein said first speaker and said second speaker comprise a surround back left speaker and a surround back right speaker, respectively, for utilization in a surround sound stereo system.

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23. (Original) The system of claim 13, wherein one or more of said subtractor circuit, spectral weighting filter, and cross-cancellation circuit is implemented in whole or in part in the digital domain.

24. (Currently Amended) A method of sound reproduction, comprising the steps of:

placing a left speaker and a right speaker in close proximity;

receiving a left channel audio signal;

receiving a right channel audio signal;

generating a difference signal representing a difference between said left channel audio signal and said right channel audio signal;

applying a spectral weighting to said difference signal thereby generating a spectrally weighted signal; **[[and]]**

cross-canceling said spectrally weighted signal with said left channel audio signal and said right channel audio signal, thereby generating a first speaker signal for said left speaker and a second speaker signal for said right speaker**[[.]]**;

performing phase equalization on said difference signal prior to said step of cross-canceling said spectrally weighted signal with said left channel audio signal and said right channel audio signal; and

performing phase compensation on each of said left channel audio signal and right channel audio signal to compensate for the spectral weighting and phase equalization performed on said difference signal;

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wherein said step of performing phase equalization on said difference signal is carried out using a first plurality of all pass filters collectively having a first phase transfer function, and wherein said step of performing phase compensation on each of said left channel audio signal and right channel audio signal is carried out using a second and third plurality of all pass filters, said second plurality of all pass filters and said third plurality of all pass filters each having a collective phase transfer function complementary to a combined phase transfer function of said first phase transfer function and a spectral weighting phase transfer function associated with the step of applying spectral weighting to said difference signal.

25. (Original) The method of claim 24, wherein said step of generating said difference signal is carried out using a subtractor.

26. (Original) The method of claim 24, wherein said step of applying said spectral weighting to said difference signal is carried out using a spectral weighting filter, said spectral weighting filter being characterized by a first filter region of relatively level gain, a second filter region having a generally decreasing gain with increasing frequency, and a third filter region of relatively level gain.

27. (Original) The method of claim 26, wherein said spectral weighting filter is further characterized by a roll-off from said first filter region to said second filter region at approximately 200 Hertz.

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28. (Original) The method of claim 27, wherein said spectral weighting filter is further characterized by a boundary between said second filter region and said third filter region at approximately 2 KHz.

29. (Canceled)

30. (Canceled)

31. (Currently Amended) The method of claim ~~[[29]]~~ 24, wherein said step of performing phase equalization is carried out using a second order filter.

32. (Original) The method of claim 24, wherein said step of applying said spectral weighting to said difference signal is carried out using a linear filter.

33. (Original) The method of claim 24, wherein said left channel audio signal comprises a surround left channel audio signal which is coupled to a surround left speaker, wherein said right channel audio signal comprises a surround right channel audio signal which is coupled to a surround right speaker, and wherein said left speaker and said right speaker comprise a surround back left speaker and a surround back right speaker, respectively, for utilization in a surround sound stereo system.

34. (Original) The method of claim 24, wherein one or more of said steps of generating said difference signal, applying a spectral weighting to said difference signal,

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and cross-canceling said spectrally weighted signal with said left channel audio signal and said right channel audio signal is carried out in whole or in part in the digital domain.

35. (Currently Amended) A method for adaptively reproducing sound in a manner so as to enlarge the perceived area and stability of a stereo sound image, the method comprising the steps of:

placing a left speaker and a right speaker in close proximity;

receiving a left channel audio signal;

receiving a right channel audio signal; [and]

generating a spectrally weighted difference signal by obtaining a difference signal representing a difference between said left channel audio signal and said right channel audio signal, and applying said difference signal to a spectral weighting filter; and

cross-canceling [[a]] said spectrally weighted stereo difference signal with said left channel audio signal and said right channel audio signal prior to applying said left channel audio signal and said right channel audio signal to said left speaker and said right speaker, respectively, said spectrally weighted difference signal derived from said left channel audio signal and said right channel audio signal[[.]]; and

performing phase equalization on an output of said spectral weighting filter prior to said step of cross-canceling said spectrally weighted stereo difference signal with said left channel audio signal and said right channel audio signal;

wherein said step of performing phase equalization on said output of said spectral weighting filter is carried out using a first plurality of all pass filters, and wherein

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said step of performing phase compensation on each of said left channel audio signal and right channel audio signal is carried out using a second and third plurality of all pass filters.

36. (Canceled)

37. (Currently Amended) The method of claim ~~[[36]]~~ 35, wherein said spectral weighting filter is characterized by a first filter region of relatively level gain, a second filter region having a generally decreasing gain with increasing frequency, and a third filter region of relatively level gain.

38. (Original) The method of claim 37, wherein said spectral weighting filter is further characterized by a roll-off from said first filter region to said second filter region at approximately 200 Hertz.

39. (Original) The method of claim 38, wherein said spectral weighting filter is further characterized by a boundary between said second filter region and said third filter region at approximately 2 KHz.

40. (Canceled)

41. (Currently Amended) The method of claim ~~[[40]]~~ 35, further comprising the step of performing phase compensation on each of said left channel audio signal

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and right channel audio signal to compensate for said step of performing phase equalization on said output of said spectral weighting filter.

42. (Canceled)

43. (Currently Amended) The method of claim ~~[[40]]~~ 35, wherein said step of performing phase equalization is carried out using a second order filter.

44. (Currently Amended) The method of claim ~~[[36]]~~ 35, wherein said spectral weighting filter comprises a linear filter.

45. (Original) The method of claim 35, wherein said left channel audio signal comprises a surround left channel audio signal which is coupled to a surround left speaker, wherein said right channel audio signal comprises a surround right channel audio signal which is also fed to a surround right speaker, and wherein said left speaker and said right speaker comprise a surround back left speaker and a surround back right speaker, respectively, for utilization in a surround sound stereo system.

46. (Currently Amended) A sound reproduction system for a surround sound stereophonic system, comprising:

a surround left speaker;

a surround right speaker;

a pair of surround back speakers located in close proximity;

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a surround left channel audio signal electrically connected to said surround left speaker;

a surround right channel audio signal electrically connected to said surround right speaker; and

a sound processor receiving as inputs said left channel audio signal and said right channel audio signal, said sound processor configured to generate a difference signal representing a difference between said surround left channel audio signal and said surround right channel audio signal, apply a spectral weighting to said difference signal thereby generating a spectrally weighted signal, and cross-cancel said spectrally weighted signal with said surround left channel audio signal and said surround right channel audio signal, thereby generating a first speaker signal and a second speaker signal for said pair of surround back speakers[.];

wherein said sound processor further comprises a phase equalizer for equalizing the phase of said difference signal prior to cross-cancellation, and a plurality of phase compensators complementary in phase characteristics to a combined phase characteristic of said phase equalizer and said spectral weighting filter, said phase compensators placed in series along each of said surround left channel audio signal and surround right channel audio signal, respectively, prior to cross-cancellation.

47. (Original) The sound reproduction system of claim 46, wherein said pair of surround back speakers comprises a surround left back speaker and a surround right back speaker.

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48. (Original) The sound reproduction system of claim 46, wherein said pair of surround back speakers are located in a single speaker enclosure.

49. (Original) The sound reproduction system of claim 46, further comprising a left speaker, a right speaker, and a center speaker.

50. (Original) The sound reproduction system of claim 46, further comprising a first adaptive decorrelation circuit interposed between said surround left channel audio signal and said surround left speaker, and a second adaptive decorrelation circuit interposed between said surround right channel audio signal and said surround right speaker.

51. (Original) The sound reproduction system of claim 46, wherein said sound processor comprises a spectral weighting filter for applying said spectral weighting to said difference signal, said spectral weighting filter being characterized by a first filter region of relatively level gain, a second filter region having a generally decreasing gain with increasing frequency, and a third filter region of relatively level gain.

52. (Original) The sound reproduction system of claim 51, wherein said spectral weighting filter is further characterized by a roll-off from said first filter region to said second filter region at approximately 200 Hertz.

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53. (Original) The sound reproduction system of claim 52, wherein said spectral weighting filter is further characterized by a boundary between said second filter region and said third filter region at approximately 2 KHz.

54. (Canceled)

55. (Currently Amended) The sound reproduction system of claim ~~[[54]]~~ 46, wherein said phase equalizer comprises a plurality of all pass filters, and wherein each of said phase compensators comprises a plurality of all pass filters.

56. (Original) The sound reproduction system of claim 46, wherein said sound processor comprises a linear filter for applying the spectral weighting to said difference signal.

57. (Original) The sound reproduction system of claim 46, wherein said surround left speaker and said surround right speaker are each dipole speakers.

58. (Canceled)

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REMARKS

Claim of Priority

The claim of priority to U.S. Provisional Application Ser. No. 60/267,952 filed on February 9, 2001, is alleged to be defective because the subsequent application (U.S. Application Ser. No. 10/074,604 filed on February 11, 2002) was not filed within 1 year of the provisional filing date as required by 35 U.S.C. § 119(e). This objection is respectfully traversed.

35 U.S.C. 119(e)(3) provides that where the 1-year date after filing a provisional application falls on a Saturday, Sunday, or federal holiday, the pendency of the a provisional application is extended to the next succeeding business day. See also 37 C.F.R. 1.7(b) ("If the day that is twelve months after the filing date of a provisional application under 35 U.S.C. 111(b) and § 1.53(c) falls on Saturday, Sunday, or on a Federal holiday within the District of Columbia, the period of pendency shall be extended to the next succeeding secular or business day which is not a Saturday, Sunday, or a Federal holiday.")

In the instant case, February 9, 2002 fell on a Saturday. See Exh. A. Thus, the pendency of the February 9, 2001 provisional application was statutorily extended to February 11, 2002, a Monday. The '604 application was timely filed on February 11, 2002, and the claim of priority to the '952 provisional application is valid. It is therefore respectfully requested that the objection to the claim of priority be withdrawn.

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Claim Amendments

As previously noted, claims 1-7, 11-17, 20-29, 31-41, 43-53, and 56-58 presently stand rejected under 35 U.S.C. § 102(b) and 103(a) as allegedly unpatentable over various items. Without acquiescence in the grounds of the rejection, Applicant herein has amended claims 1, 13, 24, 35, and 46 to incorporate the subject matter of the relevant allowed claims, including any intervening claims.

Specifically, the subject matter of claim 8 has been incorporated into claim 1; the subject matter of claims 17 and 18 has been incorporated into claim 13; the subject matter of claims 29 and 30 has been incorporated into claim 24; the subject matter of claims 36, 40 and 42 has been incorporated into claim 35; and the subject matter of claim 54 has been incorporated into claim 46. It is respectfully submitted that claims 1, 13, 24, 35, and 46 are thus placed in allowable form. Claims 8, 17, 18, 29, 30, 36, 40, 42, and 54 have been cancelled in view of the incorporation of their subject matter into their respective independent claims.

In incorporating the subject matter of claim 8 into claim 1, Applicant has corrected the term "spectrally weighted difference signal" in claim 8 to read "spectrally weighted stereo difference signal" so as to refer back to the proper signal, and to clarify the antecedent basis. It is respectfully submitted that this correction is not substantive in nature and does not affect the allowability of claim 8.

Similarly, in incorporating the subject matter of claim 40 into claim 35, Applicant has corrected the term "bass-enhanced stereo difference signal" in claim 40 to read "spectrally weighted stereo difference signal" so as to refer back to the proper signal, and to clarify the antecedent basis. It is respectfully submitted that this correction is not

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substantive in nature and does not affect the allowability of the instant claims. This change also addresses the claim rejection under 35 U.S.C. § 112, ¶ 2, which is now moot.

Claims 9, 10, 19, 20, 31, 37, 41, 43, 44, and 55, all of which are dependent claims, have each been amended to refer back to the appropriate base claims, in view of cancellation of the claims from which they previously depended and incorporation of the subject matter of the canceled claims into the independent claims.

Request for Allowance

In view of the foregoing, it is believed that the present application stands in condition for final allowance, and a notice of allowance is earnestly solicited.

Respectfully submitted,

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By: 

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